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compagni in 1857), a translation made quite certainly in the early part of the twelfth century, the unknown writer states that there is some diversity among men in writing the figures for 5, 6, 7, and 8. This may even have been in Al-Khowarizmi's lost original treatise on arithmetic; no forms are found at this point in the unique Cambridge MS. of the translation. In passing we may note that the 2 written in form like a 7 is indicative of writing earlier than about 1,350 while a three which resembles a printed *r* (small *r*) is characteristic of the twelfth or early thirteenth century.

Mr. Hill has previously established a reputation in the field of numismatics, particularly Greek, and in Greek history. In the present treatise Mr. Hill has rendered a real service to the history of science by his patient and long-continued search for early appearances of the Hindu-Arabic numerals in Europe and by their publication in this convenient form.

The price of the book is $1.00; and it may be obtained from the Oxford University Press, 29 W. 32d St., New York City.

LOUIS C. KARPINSKI.

PROBLEMS AND SOLUTIONS.

EDITED BY B. F. FINKEL AND R. P. BAKER.

PROBLEMS FOR SOLUTION.

ALGEBRA.

445. Proposed by S. A. JOFFE, New York City.

Sum the series

$$\binom{cn}{a} - \binom{a}{1}\binom{cn-c}{a} + \binom{a}{2}\binom{cn-2c}{a} - \cdots + (-1)^a\binom{cn-ca}{a}.$$

446. Proposed by CLIFFORD N. MILLS, Brookings, South Dakota.

Solve the equations

$$x^2(y-z) = l^2(m-n), \qquad y^2(z-x) = m^2(n-l), \qquad z^2(x-y) = n^2(l-m).$$

447. Proposed by ELIJAH SWIFT, University of Vermont.

(*a*) A method is sought of forming an equation such that the first k figures of some root shall be given numbers. For example, form a cubic equation such that one of its roots is 1.918 +.

(*b*) Of all the equations suggested in (*a*), determine that one for which the sum of the absolute values of the coefficients is least.

GEOMETRY.

476. Proposed by CLIFFORD N. MILLS, Brookings, South Dakota.

Show that the locus of the middle points of a set of parallel chords intercepted between an hyperbola and its conjugate is $4b_1^2x^2y^2 - 4a_1^2y^4 = a_1^2b_1^4$.

Ashton's *Analytical Geometry*, p. 194, Prob. 34.

477. Proposed by N. P. PANDYA, Sojitra, India.

A village A_0 is equidistant from ten villages, $A_1, A_2, A_3, \cdots, A_{10}$. The distances, A_1A_2, A_2A_3, $\cdots$, A_9A_{10}, $A_{10}A_1$, are in arithmetic progression. A person, starting from A_0, has to go to four of these villages consecutively, and has then to return to A_0. What four villages should he select so that the total distance traveled by him may be a minimum?